Artificial Intelligence

Jyoti M

Tata Consultancy Services ltd.
Synergy Park, Non SEZ, Gacchibowli, Hyderabad - 500032

Abstract: Artificial Intelligence is a science and technology based on computer science, biology, psychology, linguistics, mathematics and engineering. Major focus of AI is in the development of computer functions associated with human intelligence such as reasoning, learning and problem solving. The central scientific goal of AI is to understand the principles that make intelligent behaviour possible in natural or artificial systems. This is done by the analysis of natural and artificial agents, formulating and testing hypothesis about what it takes to construct intelligent agents. It involves designing, building and experimenting with computational systems that perform tasks which require intelligence.

Keywords: Artificial Intelligence, agents, goals, knowledge

Capabilities classified as artificial intelligence include understanding human speech, self-driving cars, interpreting complex data etc. Goals of Artificial Intelligence research include reasoning, knowledge, planning, learning, natural language processing, perception and the ability to move and manipulate objects. Knowledge representation and knowledge engineering are central to AI research. Many of the problems machines are expected to solve require extensive knowledge of the world. AI represents objects, properties, categories and relations between objects, situations, events causes and effects. Intelligent agents must be able to set goals and achieve them. They need a way to visualise the future i.e. they must have representation of the state of the world and be able to make predictions about how their actions will change. Emotional and social skills play two roles for an intelligent agent. First, it must be able to predict the actions of others, by understanding their motives and emotional states. In an effort to facilitate human-computer interaction, an intelligent machine might want to be able to display emotions.

Artificial Intelligence is accomplished from three viewpoints: computational psychology, computational philosophy and computer science. Computational psychology is used to make - computer programs that mimic human behaviour. Computational philosophy is used to develop an adaptive free-flowing computer mind. Implementing computer science serves the goal of creating computers that can perform tasks that only people could accomplish previously. Together the humanesque behaviour mind and actions makeup artificial intelligence. The goal of AI is to create technology that allows computers and machines to function in an intelligent manner. This can be done through developing and creating efficient method for planning and learning in-order for the outcomes to be relevant and applicable to the given situation. Short term and long term research goals have been created in order to develop AI technology. Short term goals might include how AI influences the economy, laws and ethics involved with AI and how to minimise AI security risks. In the long term, it is proposed to continue optimizing function while minimizing the security risks that come with new technologies.

An intelligent system is a system that perceives its environment and takes actions that maximises its chances of successes. Programs are simple intelligent agents that solve specific problems. Human beings and organizations of human beings such as firms are more complicated agents. This paradox makes researchers study isolated problems and finds solutions that are both verifiable and useful without agreeing on a single approach. Simple exhaustive searches are rarely sufficient for most real world problems: the search space quickly grows to astronomical numbers. The result is a search that is too slow or never completes. The solution is to use "heuristics" or "rules of thumb" that eliminate choices that are unlikely to lead to the goal. Heuristics supply the program with a best guess for the path on which the solution lies. Heuristics limit the search for solution into a smaller sample size. As per the theory of optimization, we begin the search with some form of a guess and then refine the guess incrementally until no more refinements can be made. Evolutionary computation uses a form of optimization search. They begin with a population of organisms and allow them to mutate and recombine selecting only the fittest to survive each generation.

Logic is used for knowledge representation and problem solving. Propositional logic is the logic of statements that can be true or false. First order logic

expresses facts about objects, their properties and their relations with one another. Fuzzy logic is a version of first order logic which allows the truth of a statement to be represented as a value between 0 and 1. This makes us understand that the theory and development of computer systems able to perform tasks normally requiring human intelligence such as visual perception, speech recognition, decision making and translation between languages. It is a way of making a computer, a computer controlled robot or a software think intelligently in a similar manner that intelligent humans think. AI is accomplished by studying how human brains think and how humans learn, decide and work while trying to solve a problem and use the outcomes of this study as a basis of developing intelligent software and systems.

Declarations

List of Abbreviations

AI - Artificial Intelligence

IT - Information Technology

Competing Interests

This is to confirm that the author Jyoti Madabhushi does not have any competing interest in the manuscript.

Funding

This is to confirm that the author does not have any sources of funding and is self funded.

End Notes

A computational agent is an agent whose decisions about its actions can be explained in terms of computation. The decision can be broken down into primitive operations that can be implemented in a physical device. The central engineering goal of AI is the design and synthesis of useful, intelligent artifacts i.e. agents which can act intelligently and are useful in many applications. It learns from experience and makes appropriate choices given its perceptual and computational limitations. Study of computation is central to AI. It is essential to understand algorithms, data structures to build intelligent machines. AI comes under the umbrella of cognitive science. It provides tools to build intelligence rather than just studying the external behaviour of intelligent agents or dissecting the inner working of intelligent systems.